

BIBC 102
Summer Session One
All Lectures Pre-Recorded

Course Information

Instructor: Matt Flagg
mflagg@ucsd.edu

Office Hours: Monday and Wednesday starting at 11:00 a.m. PDT
Additional office hours available by appointment

Contacting me: Your first source for help should be the discussion boards on Canvas. We will check them on a regular basis. Otherwise, please try to attend my office hours if you have questions related to course material. It is much easier to explain concepts in person than by email. If you need to send me an email, please include "BIBC102" in the subject line and allow 24 hours for me to reply. If I have not replied in 24 hours, please send the email again.

IAs: Mikael Fakhoury: mefakhou@ucsd.edu
Section A01, MW 2:00-2:50 p.m. PDT
Section A02, MW 3:00-2:50 p.m. PDT
Office hours: M 4 p.m. and Th at 11 a.m. PDT

Shreya Shriram: sshiram@ucsd.edu
Section A03, MW 4:00-4:50 p.m. PDT
Office hours: Tue at 10 a.m. PDT

Brian Nguyen: b6nguyen@ucsd.edu
Section A04, MW **6:00-6:50 p.m.** PDT
Office hours: Fri at 6 p.m. PDT

Lectures

Due Mondays and Wednesdays by 11 a.m. (see Canvas)

Mini Quizzes

Due Mondays and Wednesdays by 11 a.m. (see Canvas)

Problem Sets

Due Tuesdays and Thursdays by midnight (see Canvas)

Weekly Cumulative Quizzes

Due Sundays by midnight (see Canvas)

Weekly Discussion Boards

Due Sundays by Midnight (see Canvas)

Midterm

Wednesday, July 14th from 11 a.m. to 1:50 p.m. PDT

Final exam

Friday, July 30th from 11 a.m. to 2:00 p.m. PDT

Course Description

This course will cover thermodynamics, organic chemistry, enzyme properties, and central metabolic pathways. It aims to show how simple principles can be used to understand the pageantry of metabolism. Corny, I know, but metabolism is intricate and ancient biology. It's also a hot topic in current research.

The course begins with a review of basic thermodynamics and organic chemistry. That review will allow us to understand metabolic reactions and coupling, the way cells store and expend metabolic energy. We'll then consider the kinetics of chemical reactions, the mechanisms of enzyme catalysis, and the regulation of catalytic activity. Together, these topics will allow us to understand the "logic" of metabolism.

The remainder of the course will focus on central metabolism, the pathways by which basic biomolecules are broken or built. We'll aim to understand how energy is produced by glycolysis, the citric acid cycle, beta oxidation, and the electron transport chain, and we'll see how that energy is utilized to construct the building blocks of biology. Finally, we'll learn about the regulatory mechanisms that coordinate metabolism not only in a single cell but throughout the human body. By the end of the course, we'll understand how metabolism supports life and, in some cases, how it underlies disease.

Prerequisites: Chem 40A or Chem 140A or BENG 120 and Chem 40B or Chem 140B or BENG 120.

Note: Students may not receive credit for both BIBC 102 and Chem 114B.

About the Instructor

I am a postdoctoral fellow in the biosciences department. In the near future, I plan to pursue a second postdoc in academia with a continued focus on mentorship and teaching. If things go well, I'll eventually look for a professorship at a small liberal arts college. I imagine my research will always focus on biology, but I'm also interested in evidence-based learning and how college classes can be made more engaging, thought provoking, and career oriented.

Course Learning Outcomes

Upon completion of this course, learners will be able to:

1. Use thermodynamic and biochemical principles to explain how catabolism enables anabolism.
2. Use biochemical principles to model and predict enzyme behavior.
3. Effectively navigate a map of human metabolism using “net reactions.”
4. Appraise metabolic contributions to human diseases and health.

Course Materials and Tools

Text/Readings/Other material

There are no required texts for this course. However, Lehninger’s *Principles of Biochemistry* and Stryer’s *Biochemistry* are both *far better* resources than Wikipedia or YouTube, in my experience.

We will make use of several writeups made by Randy Hampton throughout the quarter. Those will be made available on Canvas.

Accessing Canvas

<https://coursefinder.ucsd.edu/>

Login: UC San Diego Active Directory credentials

Technology Requirements

All lectures are available for streaming and download on Canvas.

Please download Stanford’s [Pathways of Human Metabolism](#). This will also be used frequently.

Grading Information

97%-100%	A+	77-80%	C+
93-97%	A	73-77%	C
90-93%	A-	70-73%	C-
87-90%	B+	60-70%	D
83-87%	B	<60%	F
80-83%	B-		

Assignment	Weight
Discussion Boards x 5	5%
Mini quizzes	9%
Cumulative quizzes x 4	12%
Problem Sets x 9	18%
Midterm	26%
Final Exam	30%
	100%

Grading Procedure

First and foremost, students in this class will NOT—in any way—be competing with one another for grades. I have no quotas for As, Bs, Cs, etc. I reserve the right to adjust the above scale, but any changes will always work in your favor. I will NOT make grading more stringent.

The midterm and final will be graded in a timely fashion. Grades will be posted on Canvas.

Exam Regrades

All requests for exam regrades will be taken under consideration. Regrades should be submitted **within a week of the test being handed back**. The request should include an explanation of why additional points should be awarded and should be emailed to me. I will personally evaluate regrades and reply to them back in timely fashion.

Attendance and Participation

As per university guidelines, there are no attendance grades this quarter. However, I strongly suggest that you attend discussion as a way to tackle the bi-weekly problem sets. There is no discussion on the first day of class, but there WILL be one the day of the midterm.

Students are not required to attend the discussion sections they are enrolled in. We recognize that people are in different time zones, etc. That being said, please try to attend the same discussion each week so the IA and your classmates get to know you.

Since there are no required synchronous elements to the course, I do not anticipate absences being an issue. However, extenuating circumstances might arise, and absences for any sincerely held religious belief, observance, or practice will be accommodated where reasonable. Contact me if need be, and we'll discuss options.

Meaningful participation on the discussion boards is **required each week**. You should do one of the following:

- 1) Ask a meaningful question.
- 2) Respond to a classmate's question in a meaningful way.
- 3) Present something interesting and meaningful about the week's topic.

Extra Credit

1% extra credit will be given to the entire class if 90% of the class fills out their CAPES.

Late or Missing Assignments

Online quizzes, discussion boards, and problem sets will be due at the same time every week. Those due dates are listed clearly on Canvas, so barring technical issues, late or missing quizzes or posts will be counted as a zero.

Course Format

All lecture material is pre-recorded and posted on Canvas. My hope is that this format is significantly more student (and instructor) friendly than three-hour long lectures—not that that’s a very high bar. Every “lecture” is between fifteen and thirty minutes long. My feeling is that they will take longer than that: give yourself time to pause, rewind, take notes. Each lecture is followed by a mini quiz. They are intended to be like clicker questions and will be as closely aligned with learning objectives as possible. They aim to check your understanding and to help you test your grasp of the week’s material.

Discussion sections will be a similar mixture of lecture and active learning. So, please arrive at discussion ready to participate, both for your own sake and for that of your peers. This highly condensed, five-week-long session will fly by, and we all need to work together.

General Course Schedule

Approx Week	Topics
1	Thermodynamics underpin metabolism
2	Catalysis and Enzyme Kinetics
2	Enzyme and Pathway Regulation, Redox
3	Glycolysis
3	Midterm
3	Fermentation, Pyruvate Dehydrogenase Complex, The Krebs Cycle
4	The Krebs Cycle, Oxidative Phosphorylation
4	Fatty Acid Catabolism and Anabolism
5	Exercise Metabolism (Guest Lecture), Gluconeogenesis and Glycogen
5	Nitrogen Metabolism, Course Review

Student Resources for Support and Learning

Library Help

For questions about eReserves and research tools:

<https://library.ucsd.edu/ask-us/triton-ed.html>

Learning Resources

[Writing Hub](#)

[Supplemental Instruction](#)

[Tutoring](#)

[Mental Health Services](#)

Community Centers

Learn about the different ways UC San Diego explores, supports and celebrates the many cultures that make up our diverse community.

<https://students.ucsd.edu/student-life/diversity/index.html>

Accessibility

Students requesting accommodations for this course due to a disability must provide a current Authorization for Accommodation (AFA) letter issued by the Office for Students with Disabilities (OSD) which is located in University Center 202 behind Center Hall. Students are required to present their AFA letters to Faculty (please make arrangements to contact me privately) and to the OSD Liaison in the department in advance so that accommodations may be arranged.

Contact the OSD for further information: <https://disabilities.ucsd.edu/>.
osd@ucsd.edu | 858. 534.4382

Inclusion

I am committed to creating a learning environment that supports diversity of thought, perspective, experience, and identity. This will be key to our success. Science is all about pooling insight and seeing problems from as many perspectives as possible. So, please share your thoughts.

I am also open to anonymous feedback am fully willing to facilitate it.

Office of Equity, Diversity, and Inclusion:

858.822.3542 | diversity@ucsd.edu | <https://diversity.ucsd.edu/>

<https://students.ucsd.edu/student-life/diversity/index.html>

<https://regents.universityofcalifornia.edu/governance/policies/4400.html>

Basic Needs

Any student who has difficulty accessing sufficient food to eat every day, or who lacks a safe and stable place to live, and believes this may affect their performance in this course, is encouraged to contact:

foodpantry@ucsd.edu | basicneeds@ucsd.edu | (858)246-2632

Technical Support

For help with accounts, network, and technical issues:

<https://acms.ucsd.edu/contact/index.html>

For help connecting to electronic library resources such as eReserves and e-journals:

<https://library.ucsd.edu/computing-and-technology/connect-from-off-campus/>

For help installing Zoom for video conferencing, virtual office hours, synchronous lectures:

<https://blink.ucsd.edu/technology/file-sharing/zoom/index.html>

UC San Diego Academic Policies

Academic Integrity

Academic Integrity is expected of everyone at UC San Diego. This means that you must be honest, fair, responsible, respectful, and trustworthy in all of your actions. Lying, cheating, or any other forms of dishonesty will not be tolerated because they undermine learning and the University's ability to certify students' knowledge and abilities. Thus, any attempt to get, or help another get, a grade by cheating, lying or dishonesty will be reported to the Academic Integrity Office and will result in sanctions. Sanctions can include an F in the class and suspension or dismissal from the University. So, think carefully before you act. Before you act, ask yourself the following questions: a) is my action honest, fair, respectful, responsible, and trustworthy, and b) is my action authorized by the instructor? If you are unsure, don't ask a friend, ask your instructor, instructional assistant, or the Academic Integrity Office. You can learn more about academic integrity at academicintegrity.ucsd.edu.

(Source: Bertram Gallant, T. (2017). Teaching for integrity. UC San Diego Academic Integrity Office.)

Refer to:

[UCSD Student Conduct Code](https://students.ucsd.edu/_files/student-conduct/ucsandiego-student-conduct-code_interim-revisions1-16-18.pdf)

(https://students.ucsd.edu/_files/student-conduct/ucsandiego-student-conduct-code_interim-revisions1-16-18.pdf)

[Principles of Community](https://ucsd.edu/about/principles.html)

(<https://ucsd.edu/about/principles.html>)

Religious Accommodation

It is the policy of the university to make reasonable efforts to accommodate students having bona fide religious conflicts with scheduled examinations by providing alternative times or methods to take such examinations. If a student anticipates that a scheduled examination will occur at a time at which his or her religious beliefs prohibit participation in the examination, the student must submit to the instructor a statement describing the nature of the religious conflict and specifying the days and times of conflict.

For final examinations, the statement must be submitted no later than the end of the second week of instruction of the quarter.

For all other examinations, the statement must be submitted to the instructor as soon as possible after a particular examination date is scheduled.

If a conflict with the student's religious beliefs does exist, the instructor will attempt to provide an alternative, equitable examination that does not create undue hardship for the instructor or for the other students in the class.

Discrimination and harassment

The University of California, in accordance with applicable federal and state laws and university policies, does not discriminate on the basis of race, color, national origin, religion, sex, gender, gender identity, gender expression, pregnancy (including pregnancy, childbirth, and medical conditions related to pregnancy or childbirth), physical or mental disability, medical condition, genetic information, ancestry, marital status, age, sexual orientation, citizenship, or service in the uniformed services (including membership, application for membership, performance of service, application for service, or obligation for service in the uniformed services). The university also prohibits harassment based on these protected categories, including sexual harassment, as well as sexual assault, domestic violence, dating violence, and stalking. The nondiscrimination policy covers admission, access, and treatment in university programs and activities.

If students have questions about student-related nondiscrimination policies or concerns about possible discrimination or harassment, they should contact the Office for the Prevention of Harassment &

Discrimination (OPHD) at (858) 534-8298, ophd@ucsd.edu, or reportbias.ucsd.edu.

Campus policies provide for a prompt and effective response to student complaints. This response may include alternative resolution procedures or formal investigation. Students will be informed about complaint resolution options.

A student who chooses not to report may still contact CARE at the Sexual Assault Resource Center for more information, emotional support, individual and group counseling, and/or assistance with obtaining a medical exam. For off-campus support services, a student may contact the Center for Community Solutions. Other confidential resources on campus include Counseling and Psychological Services, Office of the Ombuds, and Student Health Services.

CARE at the Sexual Assault Resource Center
858.534.5793 | sarc@ucsd.edu | <https://care.ucsd.edu>

Counseling and Psychological Services (CAPS)
858.534.3755 | <https://caps.ucsd.edu>

Subject to Change Policy

The information contained in this course syllabus, other than the grade and absence policies, may be—under certain circumstances such as mutual agreement to enhance student learning—subject to change with reasonable advance notice.